

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 08-177687

(43)Date of publication of application : 12. 07. 1996

(51) Int. Cl. F02M 69/04

F02F 1/24

F02P 13/00

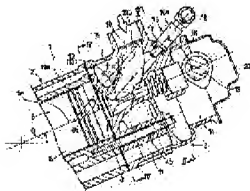
F02P 13/00

F02P 15/00

(21)Application number : 06-319649 (71)Applicant : DAIHATSU MOTOR CO LTD

(22)Date of filing : 22. 12. 1994 (72)Inventor : SHIRAI JUNICHIRO
SHIMONISHI AKIRA
OKADA HIROFUMI

(54) STRUCTURE OF SPARK IGNITION TYPE INTERNAL COMBUSTION ENGINE
PROVIDED WITH FUEL INJECTION VALVE



(57)Abstract:

PURPOSE: To prevent fuel from covering a spark plug also to attain downsizing and weight reduction, by arranging an intake valve and an exhaust valve in a part or the like on a lengthwise center line in parallel to a crankshaft line, on the other hand arranging the spark plug sideward the intake valve in a part opposed to the exhaust valve.

CONSTITUTION: An intake port 10 provided with an intake valve 12 in an opening part and an exhaust port 13 provided with an exhaust valve 13 similarly in an opening part to a combustion chamber 8, in which a spark plug 19 appears, are respectively arranged in right/left both sides in the lengthwise direction of a cylinder head 3. On the other hand, a fuel injection valve 16 is arranged in the intake port 10, to tilt this valve axial line 16a facing outward relating to an axial line 6a of a cylinder 6. Here are arranged the intake/exhaust valves 12, 13 in a part or the like on a lengthwise center line in parallel to a crankshaft line in a plane view of an internal combustion engine with each axial line placed in parallel to the axial line 6a of the cylinder 6. On the other hand, the spark plug 19 is arranged sideward the intake valve 12 in a part opposed to the exhaust valve 13 in a plane view with this spark plug axial line 19b tilted facing outward relating to the axial line 6a of the cylinder 6.

LEGAL STATUS

[Date of request for examination] 25.03.1999

[Date of sending the examiner's decision of rejection] 24.10.2000

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number] 3372378

[Date of registration] 22.11.2002

[Number of appeal against examiner's decision of rejection] 2000-18548

[Date of requesting appeal against examiner's decision of rejection] 24.11.2000

[Date of extinction of right]

* NOTICES *

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.

- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] The inlet port which equipped with the inlet valve opening to the combustion chamber which an ignition plug expects to one side among the right-and-left both sides of the longitudinal direction in the cylinder head In the internal combustion engine which inclines the axis of the fuel injection valve concerned outward to the axis of a cylinder in a fuel injection valve, and prepares and grows into the other side to said inlet port while arranging in each the exhaust port which equipped opening to a combustion chamber with the exhaust valve Said inlet valve and exhaust valve are set to an internal combustion engine's plane view. To the part on a crankshaft line and a parallel longitudinal center line, or the part of a longitudinal center line and near While making the axis of the inlet valve concerned and an exhaust valve into the axis of a cylinder at abbreviation parallel and forming it The ignition plug expected to said combustion chamber is set to plane view. In the side of said inlet valve to and the part which faces said exhaust valve Structure of the jump-spark-ignition type internal combustion engine having the fuel injection valve characterized by inclining and arranging the axis of the ignition plug concerned outward to the axis of a cylinder like the axis of said fuel injection valve.

[Translation done.]

* NOTICES *

JPO and NCIP are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the structure in the jump-spark-ignition-type internal combustion engine which equips each of the inlet port to each cylinder with a fuel injection valve, and grows into it.

[0002]

[Description of the Prior Art] In the former and this kind of jump-spark-ignition type internal combustion engine For example, as indicated by JP,63-140168,U etc. The inlet valve to the inlet port established in one side among the right-and-left both sides of the longitudinal direction in the cylinder head, While inclining and arranging mutually the axis of the inlet valve concerned and an exhaust valve outward [of an opposite direction] to the axis of a cylinder, the exhaust valve to the exhaust port established in the other side To each of each of said inlet port, to the axis of a cylinder, in a fuel injection valve, incline the axis of the fuel injection valve concerned outward still more greatly than said inlet valve, and it prepares. Furthermore, the ignition plug expected to the part of the other side at a combustion chamber is made the configuration referred to as inclining the axis of the ignition plug concerned outward to the axis of a cylinder, and arranging among the right-and-left both sides of the longitudinal direction in said cylinder head.

[0003] namely, in the jump-spark-ignition type internal combustion engine having the fuel injection valve in the former It adds to inclining and arranging the inlet valve to each inlet port in one side outward among the right-and-left both sides of the longitudinal direction in the cylinder head. By being the configuration referred to as inclined and arranging still more greatly than said inlet valve the fuel injection valve to each inlet port outward There is relation with fuel delivery tubing which distributes a fuel to said each fuel injection valve. Since the ignition plug to a combustion chamber cannot be prepared in the part of one side among the right-and-left both sides of the longitudinal direction in said cylinder head, the ignition plug to a combustion chamber It is made the configuration referred to as inclined and arranging in the part of the other side outward among the right-and-left both sides of the longitudinal direction in the cylinder head.

[0004]

[Problem(s) to be Solved by the Invention] However, since the fuel by which injection supply was carried out to it being the configuration

referred to as arranging an inlet port with a fuel injection valve in one side, and arranging an ignition plug in the part of the other side in this way among the right-and-left both sides of the longitudinal direction in the cylinder head into the inlet port from the fuel injection valve will be transmitted to the inner surface of an inlet port and a combustion chamber and will result in an ignition plug, it is easy to generate the so-called fogging in an ignition plug, and there is a problem said that the startability in low temperature is low.

[0005] and the thing which the inlet valve and the exhaust valve incline outward [each] to the axis of a cylinder -- in addition, since the breadth dimension of the whole which includes fuel delivery tubing to said fuel injection valve for the fuel injection valve to an inlet port inclining outward more greatly than said inlet valve increased substantially, there was also a problem referred to as inviting enlargement of an internal combustion engine.

[0006] When a slant was carried out and it carried in the car of a cab over type for the ignition plug being especially prepared in the other side among the right-and-left both sides of the longitudinal direction in said cylinder head so that the one side in the cylinder head may be made into facing up, the maintainability over said ignition plug worsened. This invention makes it a technical technical problem to solve these problems.

[0007]

[Means for Solving the Problem] This invention among the right-and-left both sides of the longitudinal direction in "cylinder head in order to attain this technical technical problem to one side The inlet port which equipped with the inlet valve opening to the combustion chamber which an ignition plug overlooks to the other side In the internal combustion engine which inclines the axis of the fuel injection valve concerned outward to the axis of a cylinder in a fuel injection valve, and prepares and changes to said inlet port while arranging in each the exhaust port which equipped opening to a combustion chamber with the exhaust valve Said inlet valve and exhaust valve are set to an internal combustion engine's plane view. To the part on a crankshaft line and a parallel longitudinal center line, or the part of a longitudinal center line and near While making the axis of the inlet valve concerned and an exhaust valve into the axis of a cylinder at abbreviation parallel and forming it the ignition plug expected to said combustion chamber -- plane view -- setting -- the side of said inlet valve -- and the axis of the ignition plug concerned is inclined and arranged in the part which faces said exhaust valve outward to the axis of a cylinder like the axis

of said fuel injection valve. It was made the configuration called ”.

[0008]

[work --] for Thus, while arranging an inlet valve and an exhaust valve in the part on a crankshaft line and a parallel longitudinal center line, or the part of a longitudinal center line and near in an internal combustion engine's plane view By having arranged the ignition plug expected to a combustion chamber in the part which is the side of said inlet valve in plane view, and faces said exhaust valve, an ignition plug Since it is made the most distant part in a location to the flow of the inhalation of air from an inlet port to a combustion chamber, it can reduce certainly that the fuel by which injection supply was carried out from the fuel injection valve is transmitted to the inner surface of an inlet port and a combustion chamber, and results in said inlet port at an ignition plug, i.e., the fogging of a fuel occurs in an ignition plug.

[0009] On the other hand, by having made the axis of said inlet valve into the axis of a cylinder at abbreviation parallel By could follow this, and could make small whenever [in the fuel injection valve to an inlet port / outward tilt-angle], in addition having made the axis of said exhaust valve into the axis of a cylinder at abbreviation parallel The breadth dimension of the whole including fuel delivery tubing to said fuel injection valve can be made smaller than said conventional thing.

[0010] And attachment and detachment of this ignition plug can be performed by having inclined the axis of said ignition plug outward like the axis of said fuel injection valve, without being interfered by fuel delivery tubing to said fuel injection valve.

[0011]

[Effect of the Invention] Therefore, while being able to improve the startability in the low temperature in the jump-spark-ignition type internal combustion engine having a fuel injection valve according to this invention, small and lightweight-ization can be attained, and moreover, it has the effectiveness of a slant being carried out and being able to carry, without getting worse the maintainability of an ignition plug on the car of a cab over type.

[0012]

[Example] Hereafter, the example of this invention is explained about the drawing of drawing 1 - drawing 4 . In this drawing, a sign 1 shows the Taki cylinder internal combustion engine. This Taki cylinder internal combustion engine 1 It consists of a cylinder block 2 and the cylinder head 3 concluded on the top face by two or more cylinder-head bolts 4a and 4b. To said cylinder block 2 Depression formation of the

combustion chamber 8 which two or more cylinders 6 which equipped the interior with the piston 5 are formed in the shape of a single tier along with a crankshaft line and the parallel longitudinal center line 7, and carries out opening to said each cylinder 6 on the underside of said cylinder head 3 is carried out.

[0013] In addition, said Taki cylinder internal combustion engine 1 is constituted by the slant mold referred to as inclining at an include angle θ and carrying axis 6a of said cylinder 6 in the car of a cab over type suitably to the level surface 9. The exhaust port 11 the inlet port 10 which carries out opening to said combustion chamber 8 carries out [the exhaust port] opening in said combustion chamber 8 at the other side, i.e., the part below axis 6a of said cylinder 6, to one side, i.e., the part above axis 6a of said cylinder 6, among the right-and-left both sides of the longitudinal direction in the cylinder head 3 concerned is respectively formed in the interior of said cylinder head 3.

[0014] Opening into the combustion chamber 8 of said inlet port 10 The part on said longitudinal center line 7, It arranges in the part of the longitudinal center line 7 and near. To this opening or an inlet valve 12 While setting the axis of the inlet valve 12 concerned to axis 6a of said cylinder 6 at abbreviation parallel and forming it, opening into the combustion chamber 8 of said exhaust port 11 The part on said longitudinal center line 7, It arranges in the part of the longitudinal center line 7 and near. To this opening or an exhaust valve 13 The axis of the exhaust valve 13 concerned is set to axis 6a of said cylinder 6 at abbreviation parallel, and is formed, and it constitutes from one cam shaft 15 which arranged each [these] inlet valve 12 and each exhaust valve 13 at said longitudinal axis 7 and parallel in the valve gear room 14 of formation on the top face of said cylinder head 3 so that closing motion actuation may be carried out.

[0015] Moreover, a sign 16 shows the fuel injection valve for carrying out injection supply of the fuel from the fuel-supply hole 17 in said each inlet port 12, and between said fuel-supply hole 17 and the fuel delivery tubing 18, to axis 6a of said cylinder 6, suitably, as only an include angle θ 1 inclines outward, it equips this fuel injection valve 16 with axis 16a of the fuel injection valve 16 concerned outward.

[0016] Furthermore, a sign 19 shows the ignition plug to said each combustion chamber 8, and receives said cylinder head 3 in this ignition plug 19 again. It is located in the part which polar-zone 19a in the ignition plug 19 concerned is the side of said inlet valve 12 in plane view in in a combustion chamber 8, and faces said exhaust valve 13. Like axis 16a of said fuel injection valve 16, to axis 6a of a cylinder 6,

suitably, axis 19b in the ignition plug 19 concerned screws it on it, as only an include angle θ_2 inclines outward.

[0017] In addition, the cylinder head cover 20 for taking up the valve gear room 14 is attached in the top face of said cylinder head 3. Thus, while arranging an inlet valve 12 and an exhaust valve 13 in the part on a crankshaft line and the parallel longitudinal center line 7, or the part of the longitudinal center line 7 and near in an internal combustion engine's 1 plane view By having arranged polar-zone 19a in the ignition plug 19 desired in a combustion chamber 8 in the part which is the side of said inlet valve 12 in plane view, and faces said exhaust valve 13, said ignition plug 19 Since it is made the most distant part from an inlet port 10 in a location to the flow of the inhalation of air shown by the arrow head A which flows in a combustion chamber 8 It can reduce certainly that the fuel by which injection supply was carried out from the fuel injection valve 16 into said inlet port 10 is transmitted to the inner surface of an inlet port 10 and a combustion chamber 8, and results in polar-zone 19a in an ignition plug 19, i.e., the fogging of a fuel occurs in polar-zone 19a of an ignition plug 19.

[0018] Moreover, by having set the axis of said inlet valve 12 to axis 6a of a cylinder 6 at abbreviation parallel By could follow this, and could make θ_1 small whenever [in the fuel injection valve 16 to an inlet port 10 / outward tilt-angle], in addition having set the axis of said exhaust valve 13 to axis 6a of a cylinder 6 at abbreviation parallel The breadth dimension of the whole including the fuel delivery tubing 18 to said fuel injection valve 16 can be substantially made smaller than the case where it inclines outward to axis 6a of a cylinder 6 in both an inlet valve 12 and the exhaust valve 13, like before.

[0019] Furthermore, when only the include angle θ_2 inclined suitably axis 19b of said ignition plug 19 outward like axis 16a of said fuel injection valve 16, attachment and detachment of this ignition plug 16 can be performed again, without being interfered by the fuel delivery tubing 18 to said fuel injection valve 16. in addition, cylinder-head-bolt of one side of the cylinder head 3 in order to conclude said cylinder head 3 to said cylinder block 2 4among each cylinder-head boltsa [4] and 4b a -- a graphic display -- since a fuel injection valve 16 can be further brought close to axis 6a of a cylinder 6 by arranging in the outside of the valve gear room 14 like, further cutback of a breadth dimension, and further small [further] and lightweight-izing of an internal combustion engine can be attained.

[Translation done.]

* NOTICES *

JPO and NCIP are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the I-I view cross section of drawing 2 with the vertical section front view showing the example of this invention.

[Drawing 2] It is the II-II ***** Fig. of drawing 1 .

[Drawing 3] III-III of drawing 2 It is a view cross section.

[Drawing 4] It is IV-IV ***** of drawing 1 .

[Description of Notations]

- 1 Internal Combustion Engine
- 2 Cylinder Block
- 3 Cylinder Head
- 6 Cylinder
- 6a The axis of a cylinder
- 7 Longitudinal Core
- 8 Combustion Chamber
- 10 Inlet Port
- 11 Exhaust Port
- 12 Inlet Valve
- 13 Exhaust Valve
- 15 Cam Shaft
- 16 Fuel Injection Valve
- 16a The axis of a fuel injection valve
- 19 Ignition Plug
- 19a Polar zone of an ignition plug
- 19b The axis of an ignition plug

[Translation done.]

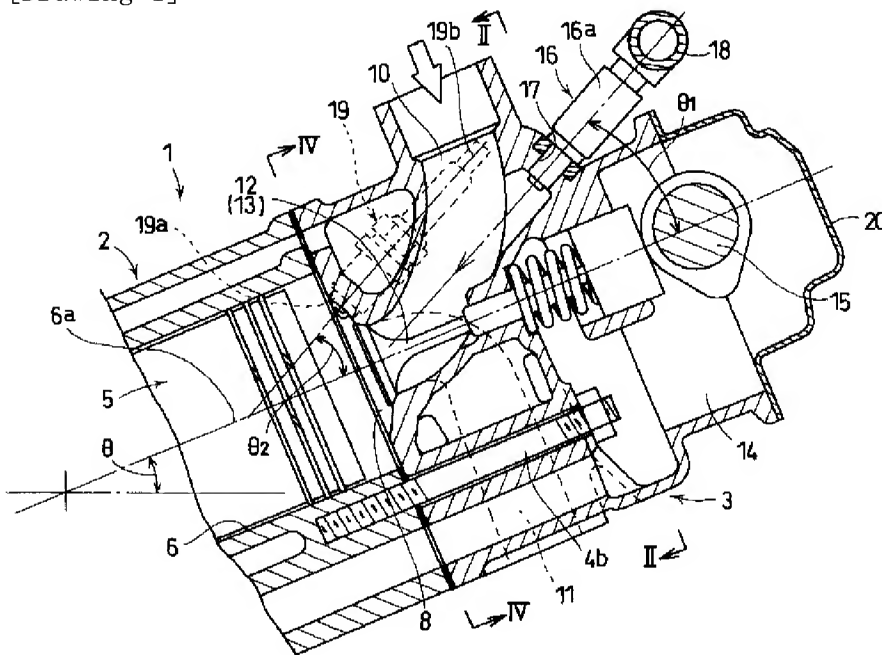
* NOTICES *

JPO and NCIP are not responsible for any damages caused by the use of this translation.

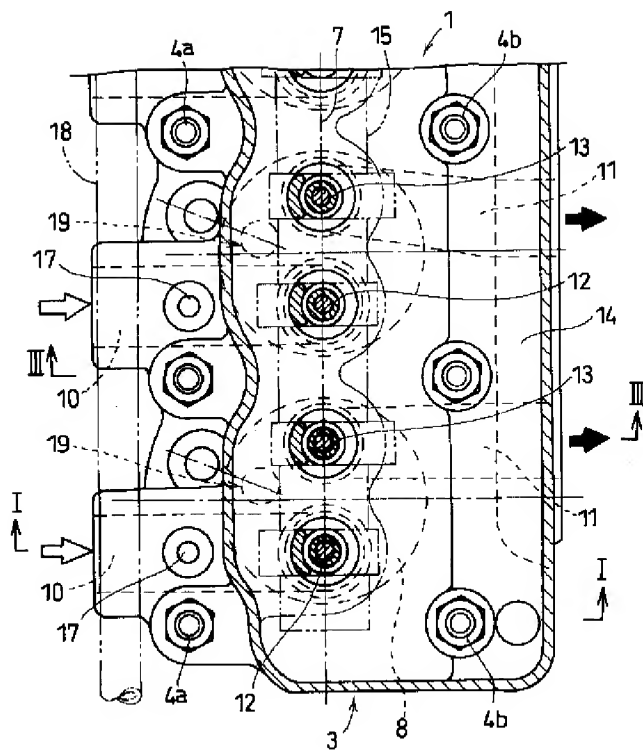
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

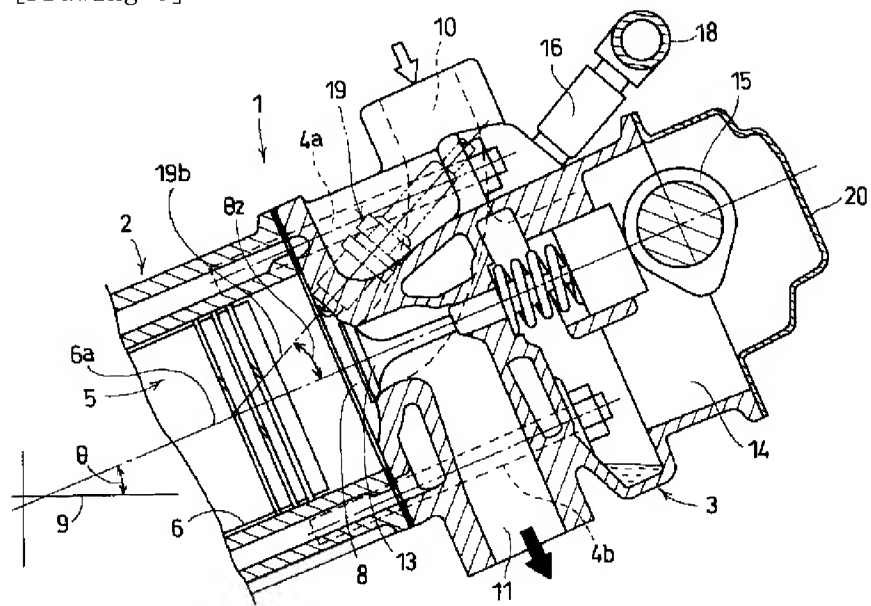
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Drawing 4]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開平8-177687

(43) 公開日 平成8年(1996)7月12日

| (51) Int.Cl. ⁶ | 識別記号 | 庁内整理番号 | F I | 技術表示箇所 |
|---------------------------|-------|--------|-----|--------|
| F 0 2 M 69/04 | | P | | |
| F 0 2 F 1/24 | | H | | |
| F 0 2 P 13/00 | 3 0 1 | A | | |
| | 3 0 3 | A | | |
| 15/00 | | F | | |

審査請求 未請求 請求項の数 1 O L (全 5 頁)

(21) 出願番号 特願平6-319649

(71) 出願人 000002967

ダイハツ工業株式会社

大阪府池田市ダイハツ町1番1号

(22) 出願日 平成6年(1994)12月22日

(72) 発明者 白井 純一郎

大阪府池田市桃園2丁目1番1号 ダイハツ工業株式会社内

(72) 発明者 下西 明

大阪府池田市桃園2丁目1番1号 ダイハツ工業株式会社内

(72) 発明者 岡田 大文

大阪府池田市桃園2丁目1番1号 ダイハツ工業株式会社内

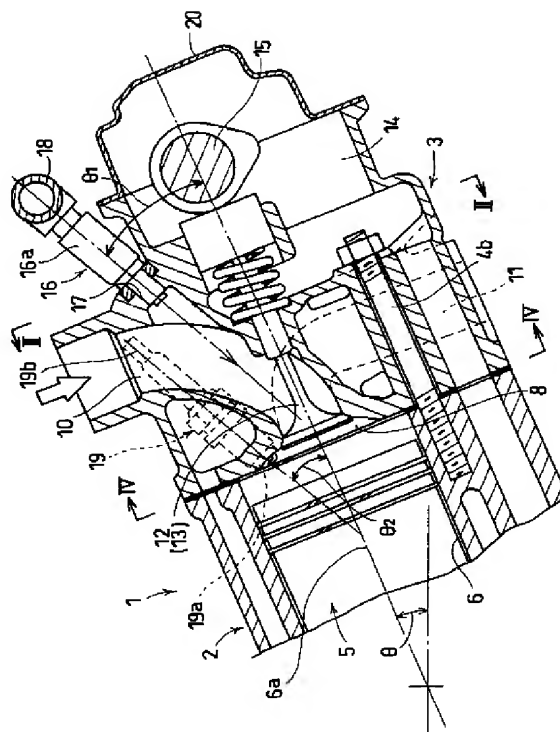
(74) 代理人 弁理士 石井 暁夫 (外2名)

(54) 【発明の名称】 燃料噴射弁を備えた火花点火式内燃機関の構造

(57) 【要約】

【目的】 シリンダヘッド3の左右両側のうち一方側に、点火栓19付き燃焼室8への開口部に吸気弁12を備えた吸気ポート10を、他方側に、燃焼室への開口部に排気弁13を備えた排気ポート11を各々配設し、前記吸気ポートに燃料噴射弁16を、シリンダ6の軸線6aに対して外向きに傾斜して設けた内燃機関において、点火栓に燃料のかぶりが発生することを低減すると共に、小型・軽量化を図る。

【構成】 前記吸気弁及び排気弁を、内燃機関の平面視において長手中心線上の部位に、その軸線をシリンダの軸線と略平行にして設ける一方、前記燃焼室内にのぞむ点火栓を、平面視において前記吸気弁の側方で且つ前記排気弁に向かい合う部位に、その軸線をシリンダの軸線に対して外向きに傾斜して配設する。



【特許請求の範囲】

【請求項1】 シリンダヘッドにおける長手方向の左右両側のうち一方側に、点火栓がのぞむ燃焼室への開口部に吸気弁を備えた吸気ポートを、他方側に、燃焼室への開口部に排気弁を備えた排気ポートを各々に配設する一方、前記吸気ポートに燃料噴射弁を、当該燃料噴射弁の軸線をシリンダの軸線に対して外向きに傾斜して設けて成る内燃機関において、前記吸気弁及び排気弁を、内燃機関の平面視においてクランク軸線と平行の長手中心線上の部位又は長手中心線と近傍の部位に、当該吸気弁及び排気弁の軸線をシリンダの軸線と略平行にして設ける一方、前記燃焼室内にのぞむ点火栓を、平面視において前記吸気弁の側方で且つ前記排気弁に向かい合う部位に、当該点火栓の軸線を前記燃料噴射弁の軸線と同様にシリンダの軸線に対して外向きに傾斜して配設することを特徴とする燃料噴射弁を備えた火花点火式内燃機関の構造。

【発明の詳細な説明】

【0001】

【産業上の利用分野】 本発明は、各気筒への吸気ポートの各々に燃料噴射弁を装着して成る火花点火式の内燃機関において、その構造に関するものである。

【0002】

【従来の技術】 従来、この種の火花点火式内燃機関においては、例えば、実開昭63-140168号公報等に記載されているように、シリンダヘッドにおける長手方向の左右両側のうち一方側に設けた吸気ポートに対する吸気弁と、他方側に設けた排気ポートに対する排気弁とを、当該吸気弁及び排気弁の軸線をシリンダの軸線に対して互いに反対方向の外向きに傾斜して配設する一方、前記各吸気ポートの各々に燃料噴射弁を、当該燃料噴射弁の軸線をシリンダの軸線に対して前記吸気弁よりも更に大きく外向きに傾斜して設け、更に、前記シリンダヘッドにおける長手方向の左右両側のうち他方側の部位に、燃焼室内にのぞむ点火栓を、当該点火栓の軸線をシリンダの軸線に対して外向きに傾斜して配設すると言う構成にしている。

【0003】 すなわち、従来における燃料噴射弁を備えた火花点火式内燃機関では、シリンダヘッドにおける長手方向の左右両側のうち一方側に、各吸気ポートに対する吸気弁を外向きに傾斜して配設することに加えて、各吸気ポートに対する燃料噴射弁を前記吸気弁よりも更に大きく外向きに傾斜して配設すると言う構成であることにより、前記各燃料噴射弁に燃料を分配する燃料デリバリ管との関係もあって、燃焼室に対する点火栓を、前記シリンダヘッドにおける長手方向の左右両側のうち一方側の部位に設けることができないから、燃焼室に対する点火栓は、シリンダヘッドにおける長手方向の左右両側のうち他方側の部位に外向きに傾斜して配設すると言う構成にしている。

【0004】

【発明が解決しようとする課題】 しかし、このように、シリンダヘッドにおける長手方向の左右両側のうち一方側に、燃料噴射弁付き吸気ポートを配設し、他方側の部位に点火栓を配設すると言う構成であると、燃料噴射弁から吸気ポート内に噴射供給された燃料が、吸気ポート及び燃焼室の内面を伝って点火栓に至ることになるから、点火栓にいわゆるかぶりが発生し易くて、低温での始動性が低いと言う問題がある。

10 【0005】 しかも、吸気弁及び排気弁が、シリンダの軸線に対して各々外向きに傾斜していることに加えて、吸気ポートに対する燃料噴射弁が、前記吸気弁よりも大きく外向きに傾斜していることのために、前記燃料噴射弁に対する燃料デリバリ管を含めた全体の横幅寸法が大幅に増大するから、内燃機関の大型化を招来すると言う問題もあった。

【0006】 特に、前記シリンダヘッドにおける長手方向の左右両側のうち他方側に点火栓が設けられていることのために、キャブオーバー型の車両に、シリンダヘッドにおける一方側を上向きとするようにスラントして搭載した場合において、前記点火栓に対する整備性が悪くなるのであった。本発明は、これらの問題を解消することを技術的課題とするものである。

【0007】

【課題を解決するための手段】 この技術的課題を達成するため本発明は、「シリンダヘッドにおける長手方向の左右両側のうち一方側に、点火栓がのぞむ燃焼室への開口部に吸気弁を備えた吸気ポートを、他方側に、燃焼室への開口部に排気弁を備えた排気ポートを各々に配設する一方、前記吸気ポートに燃料噴射弁を、当該燃料噴射弁の軸線をシリンダの軸線に対して外向きに傾斜して設けて成る内燃機関において、前記吸気弁及び排気弁を、内燃機関の平面視においてクランク軸線と平行の長手中心線上の部位又は長手中心線と近傍の部位に、当該吸気弁及び排気弁の軸線をシリンダの軸線と略平行にして設ける一方、前記燃焼室内にのぞむ点火栓を、平面視において前記吸気弁の側方で且つ前記排気弁に向かい合う部位に、当該点火栓の軸線を前記燃料噴射弁の軸線と同様にシリンダの軸線に対して外向きに傾斜して配設する。」と言う構成にした。

【0008】

【作 用】 このように、吸気弁及び排気弁を、内燃機関の平面視においてクランク軸線と平行の長手中心線上の部位又は長手中心線と近傍の部位に配設する一方、燃焼室内にのぞむ点火栓を、平面視において前記吸気弁の側方で且つ前記排気弁に向かい合う部位に配設したことにより、点火栓は、吸気ポートから燃焼室内への吸気の流れに対して最も遠い部位に位置にするから、前記吸気ポート内に燃料噴射弁から噴射供給された燃料が吸気ポート及び燃焼室の内面を伝って点火栓に至ること、つま

り、点火栓に燃料のかぶりが発生することを確実に低減できる。

【0009】一方、前記吸気弁の軸線をシリンダの軸線と略平行にしたことにより、これに追従して吸気ポートに対する燃料噴射弁における外向きの傾斜角度を小さくすることができ、これに加えて、前記排気弁の軸線をもシリンダの軸線と略平行にしたことにより、前記燃料噴射弁に対する燃料デリバリ管を含めた全体の横幅寸法を、前記従来のものよりも小さくすることができる。

【0010】しかも、前記点火栓の軸線を、前記燃料噴射弁の軸線と同様に外向きに傾斜したことにより、この点火栓の着脱を、前記燃料噴射弁に対する燃料デリバリ管に邪魔されることなく行うことができる。

【0011】

【発明の効果】従って、本発明によると、燃料噴射弁を備えた火花点火式内燃機関における低温での始動性を向上できると共に、小型・軽量化を図ることができ、しかも、キャブオーバ型の車両に、点火栓の整備性を悪化することなく、スラントして搭載できる等の効果を有する。

【0012】

【実施例】以下、本発明の実施例を、図1～図4の図面について説明する。この図において符号1は、多気筒内燃機関を示し、この多気筒内燃機関1は、シリンダブロック2と、その上面に複数本のヘッドボルト4a、4bにて締結したシリンダヘッド3とから成り、前記シリンダブロック2には、内部にピストン5を備えた複数個のシリンダ6が、クランク軸線と平行の長手中心線7に沿って一列状に形成され、また、前記シリンダヘッド3の下面には、前記各シリンダ6に開口する燃焼室8が凹み形成されている。

【0013】なお、前記多気筒内燃機関1は、キャブオーバ型の車両に、前記シリンダ6の軸線6aを水平面9に対して適宜角度 θ に傾斜して搭載するというスラント型に構成されている。前記シリンダヘッド3の内部には、当該シリンダヘッド3における長手方向の左右両側のうち一方側、つまり、前記シリンダ6の軸線6aよりも上側の部分に、前記燃焼室8に開口する吸気ポート10が、他方側、つまり、前記シリンダ6の軸線6aよりも下側の部分に、前記燃焼室8に開口する排気ポート11が各々形成されている。

【0014】前記吸気ポート10の燃焼室8内への開口部を、前記長手中心線7上の部位、又は、長手中心線7と近傍の部位に配設して、この開口部に、吸気弁12を、当該吸気弁12の軸線を前記シリンダ6の軸線6aと略平行にして設ける一方、前記排気ポート11の燃焼室8内への開口部を、前記長手中心線7上の部位、又は、長手中心線7と近傍の部位に配設して、この開口部に、排気弁13を、当該排気弁13の軸線を前記シリンダ6の軸線6aと略平行にして設けて、これら各吸気弁

12及び各排気弁13を、前記シリンダヘッド3の上面に形成の動弁機構室14内に、前記長手軸線7と平行に配設した一本のカム軸15にて開閉作動するように構成する。

【0015】また、符号16は、前記各吸気ポート12内に燃料供給孔17より燃料を噴射供給するための燃料噴射弁を示し、この燃料噴射弁16を、前記燃料供給孔17と燃料デリバリ管18との間に、当該燃料噴射弁16の軸線16aを前記シリンダ6の軸線6aに対して外向きに適宜角度 θ 1だけ外向きに傾斜するようにして装着する。

【0016】更にまた、符号19は、前記各燃焼室8に対する点火栓を示し、この点火栓19を、前記シリンダヘッド3に対して、当該点火栓19における電極部19aが燃焼室8内のうち平面視において前記吸気弁12の側方で且つ前記排気弁13に向かい合う部位に位置し、当該点火栓19における軸線19bが前記燃料噴射弁16の軸線16aと同様にシリンダ6の軸線6aに対して適宜角度 θ 2だけ外向きに傾斜するようにして螺着する。

【0017】なお、前記シリンダヘッド3の上面には、動弁機構室14を塞ぐためのシリンダヘッドカバー20が取付けられている。このように、吸気弁12及び排気弁13を、内燃機関1の平面視においてクランク軸線と平行の長手中心線7上の部位又は長手中心線7と近傍の部位に配設する一方、燃焼室8内にのぞむ点火栓19における電極部19aを、平面視において前記吸気弁12の側方で且つ前記排気弁13に向かい合う部位に配設したことにより、前記点火栓19は、吸気ポート10から燃焼室8内に流入する矢印Aで示す吸気の流れに対して最も遠い部位に位置にするから、前記吸気ポート10内に燃料噴射弁16から噴射供給された燃料が吸気ポート10及び燃焼室8の内面を伝って点火栓19における電極部19aに至ること、つまり、点火栓19の電極部19aに燃料のかぶりが発生することを確実に低減できる。

【0018】また、前記吸気弁12の軸線をシリンダ6の軸線6aと略平行にしたことにより、これに追従して吸気ポート10に対する燃料噴射弁16における外向きの傾斜角度 θ 1を小さくすることができ、これに加えて、前記排気弁13の軸線をもシリンダ6の軸線6aと略平行にしたことにより、前記燃料噴射弁16に対する燃料デリバリ管18を含めた全体の横幅寸法を、従来のように吸気弁12及び排気弁13の両方を、シリンダ6の軸線6aに対して外向きに傾斜した場合よりも、大幅に小さくすることができる。

【0019】更にまた、前記点火栓19の軸線19bを、前記燃料噴射弁16の軸線16aと同様に適宜角度 θ 2だけ外向きに傾斜したことにより、この点火栓16の着脱を、前記燃料噴射弁16に対する燃料デリバリ管

5

18に邪魔されることなく行うことができる。なお、前記シリンダヘッド3を、前記シリンダブロック2に対して締結するために各ヘッドボルト4a、4bのうちシリンダヘッド3の一方側におけるヘッドボルト4aを、図示のように、動弁機構室14の外側に配設することにより、燃料噴射弁16を、更にシリンダ6の軸線6aに近付けることができるから、横幅寸法の更なる縮小、内燃機関の更なる小型・軽量化を図ることができる。

【図面の簡単な説明】

【図1】本発明の実施例を示す縦断正面図で図2のI-I視断面図である。

【図2】図1のII-II視平面断面図である。

【図3】図2のIII-III視断面図である。

【図4】図1のIV-IV視底面図である。

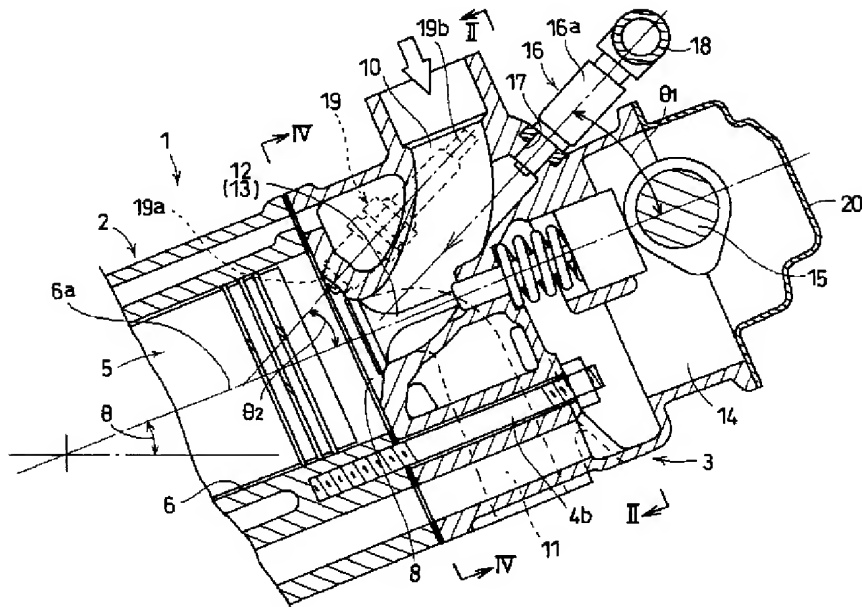
【符号の説明】

1 内燃機関

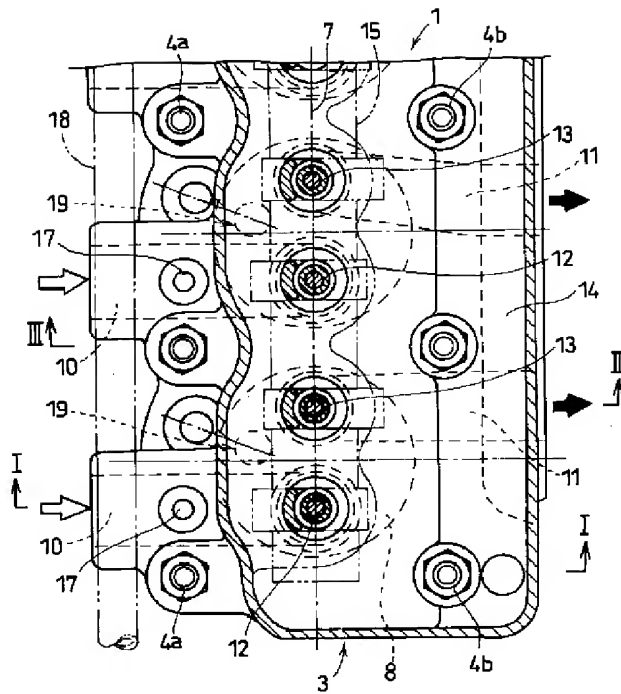
6

2 シリンダブロック
3 シリンダヘッド
6 シリンダ
6a シリンダの軸線
7 長手中心
8 燃焼室
10 吸気ポート
11 排気ポート
12 吸気弁
13 排気弁
15 カム軸
16 燃料噴射弁
16a 燃料噴射弁の軸線
19 点火栓
19a 点火栓の電極部
19b 点火栓の軸線

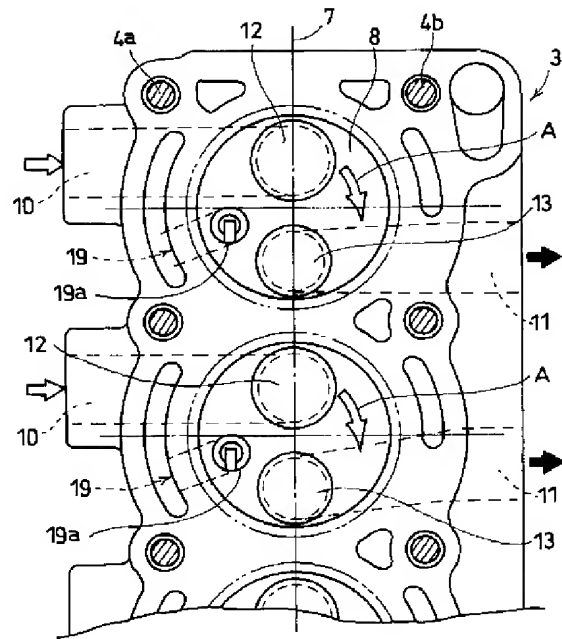
【図1】



【図2】



【図4】



【図3】

